

SEQUENCE LISTING

<110> KAHLERT, HELGA
 STUWE, HANS-THOMAS
 FIEBIG, HELMUT
 CROMWELL, OLIVER
 BECKER, WOLF-MEINHARD
 BUFE, ALBRECHT
 SCHRAMM, GABRIELE
 JAGER, LOTHAR
 MULLER, WOLF-DIETER



<120> GRAMINAE POLLEN ALLERGEN MUTANTS FOR SPECIFIC
 IMMUNOTHERAPY, AND PRODUCTION AND USE OF THE SAME

<130> MERCK-2034

<140> 09/381,903

<141> 2000-04-17

<150> PCT/EP98/01507

<151> 1998-03-16

<150> DE 197 13 001.4

<151> 1997-03-27

<160> 99

<170> PatentIn Ver. 2.1

<210> 1

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Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Ala
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<400> 2

Gly Tyr Ala Pro Ala Thr Pro Ala Ala Gly Ala
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peptide

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Pro Ala Thr Pro Ala Ala Ala Gly Ala Ala Ala Gly
1 5 10

<210> 4
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peptide

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Pro Ala Ala Ala Gly Ala Ala Ala Gly Lys Ala Thr
1 5 10

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peptide

<400> 5
Ala Gly Ala Ala Ala Gly Lys Ala Thr Thr Glu Glu
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peptide

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Ala Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu
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peptide

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Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp
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Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asn Val
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Gln Lys Leu Ile Glu Asp Ile Asn Val Gly Phe Lys
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Gly Phe Lys Ala Ala Val Ala Ala Ala Ser Val
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<210> 24

<211> 12

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<210> 25

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<210> 30

<211> 12

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Val Gly Ala Thr Pro Glu Ala Lys Phe Asp Ser Phe
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<210> 31

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peptide

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Thr Pro Glu Ala Lys Phe Asp Ser Phe Val Ala Ser
1 5 10

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peptide

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1 5 10

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Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala Leu
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<400> 37

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Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro
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<210> 42

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Glu Glu Pro Gly Met Ala Lys Ile Pro Ala Gly Glu
1 5 10

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 1 5 10

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 1 5 10

<210> 46

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 1 5 10

<210> 47

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 Thr Ala Ala Ala Thr Ala Pro Ala Asp Asp Lys Phe
 1 5 10

<210> 52
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peptide

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Ala Thr Ala Pro Ala Asp Asp Lys Phe Thr Val Phe
1 5 10

<210> 53
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<400> 53
Pro Ala Asp Asp Lys Phe Thr Val Phe Glu Ala Ala
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Asp Lys Phe Thr Val Phe Glu Ala Ala Phe Asn Lys
1 5 10

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Thr Val Phe Glu Ala Ala Phe Asn Lys Ala Ile Lys
1 5 10

<210> 56
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Glu Ala Ala Phe Asn Lys Ala Ile Lys Glu Ser Thr
1 5 10

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Phe Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Ala
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Ala Ile Lys Glu Ser Thr Gly Gly Ala Tyr Asp Thr
1 5 10

<210> 59
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Glu Ser Thr Gly Gly Ala Tyr Asp Thr Tyr Lys Cys
1 5 10

<210> 60
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<400> 60

Gly Gly Ala Tyr Asp Thr Tyr Lys Cys Ile Pro Ser
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<210> 61

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Tyr Asp Thr Tyr Lys Cys Ile Pro Ser Leu Glu Ala
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<210> 62

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Tyr Lys Cys Ile Pro Ser Leu Glu Ala Ala Val Lys
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<210> 63

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Ile Pro Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr
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<211> 12

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Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr
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Ala Val Lys Gln Tyr Ala Ala Thr Tyr Ala Ala
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<400> 66

Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Gln
1 5 10

<210> 67

<211> 12

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<213> Artificial Sequence

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<400> 67

Ala Ala Thr Val Ala Ala Ala Pro Gln Val Lys Tyr
1 5 10

<210> 68

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Val Ala Ala Ala Pro Gln Val Lys Tyr Ala Val Phe
1 5 10

<210> 69

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<223> Description of Artificial Sequence: Synthetic peptide

<400> 69

Ala Pro Gln Val Lys Tyr Ala Val Phe Glu Ala Ala
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Val Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys
1 5 10

<210> 71

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Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr
1 5 10

<210> 72

<211> 12

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Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Ser
1 5 10

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peptide

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Leu Thr Lys Ala Ile Thr Ala Met Ser Glu Val Gln
1 5 10

<210> 74
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<212> PRT
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Ala Ile Thr Ala Met Ser Glu Val Gln Lys Val Ser
1 5 10

<210> 75
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<400> 75
Ala Met Ser Glu Val Gln Lys Val Ser Gln Pro Ala
1 5 10

<210> 76
<211> 12
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peptide

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Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala
1 5 10

<210> 77
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<400> 77
 Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
 1 5 10

<210> 78
 <211> 12
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 <213> Artificial Sequence

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 peptide

<400> 78
 Gln Pro Ala Thr Gly Ala Ala Thr Val Ala Ala Gly
 1 5 10

<210> 79
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 peptide

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 Thr Gly Ala Ala Thr Val Ala Ala Gly Ala Ala Thr
 1 5 10

<210> 80
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 peptide

<400> 80
 Ala Thr Val Ala Ala Gly Ala Ala Thr Thr Ala Ala
 1 5 10

<210> 81
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peptide

<400> 81
Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala
1 5 10

<210> 82
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peptide

<400> 82
Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala
1 5 10

<210> 83
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<400> 83
Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala Thr Val
1 5 10

<210> 84
<211> 12
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<220>
<223> Description of Artificial Sequence: Synthetic
peptide

<400> 84
Gly Ala Ala Ser Gly Ala Ala Thr Val Ala Ala Gly
1 5 10

<210> 85
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 peptide

<400> 85
 Ser Gly Ala Ala Thr Val Ala Ala Gly Gly Tyr Lys
 1 5 10

<210> 86
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 peptide

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 Gly Ala Ala Thr Val Ala Ala Gly Gly Tyr Lys Val
 1 5 10

<210> 87
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 allergen

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Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asn
 20 25 30

Val Gly Phe Lys Ala Ala Val Ala Ala Ala Ser Val Pro Ala Ala
 35 40 45

Asp Lys Phe Lys Thr Phe Glu Ala Ala Phe Thr Ser Ser Ser Lys Ala
 50 55 60

Ala Ala Ala Lys Ala Pro Gly Leu Val Pro Lys Leu Asp Ala Ala Tyr
 65 70 75 80

Ser Val Ala Tyr Lys Ala Ala Val Gly Ala Thr Pro Glu Ala Lys Phe
 85 90 95

Asp Ser Phe Val Ala Ser Leu Thr Glu Ala Leu Arg Val Ile Ala Gly
 100 105 110

Ala Leu Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro Gly Met
 115 120 125

Ala Lys Ile Pro Ala Gly Glu Leu Gln Ile Ile Asp Lys Ile Asp Ala
 130 135 140

Ala Phe Lys Val Ala Ala Thr Ala Ala Ala Thr Ala Pro Ala Asp Asp
 145 150 155 160

Lys Phe Thr Val Phe Glu Ala Ala Phe Asn Lys Ala Ile Lys Glu Ser
 165 170 175

Thr Gly Gly Ala Tyr Asp Thr Tyr Lys Cys Ile Pro Ser Leu Glu Ala
 180 185 190

Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Gln Val
 195 200 205

Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met
 210 215 220

Ser Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
 225 230 235 240

Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala
 245 250 255

Thr Val Ala Ala Gly Gly Tyr Lys Val
 260 265

<210> 88

<211> 265

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Recombinant
 allergen

<400> 88

Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Ala Ala Gly Ala Ala
 1 5 10 15

Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asp
 20 25 30

Val Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Ser Val Pro Ala Ala
 35 40 45

Leu Ala Phe Lys Thr Phe Glu Ala Ala Phe Thr Ser Ser Ser Lys Ala
 50 55 60

Ala Ala Ala Lys Ala Pro Gly Leu Val Pro Lys Leu Asp Ala Ala Tyr
 65 70 75 80

Ser Val Ala Tyr Lys Ala Ala Val Gly Ala Thr Pro Glu Ala Lys Phe
 85 90 95

Asp Ser Phe Val Ala Ser Leu Thr Glu Ala Leu Arg Val Ile Ala Gly
 100 105 110
 Ala Leu Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro Gly Met
 115 120 125
 Ala Lys Ile Pro Ala Gly Glu Leu Gln Ile Ile Asp Lys Ile Asp Ala
 130 135 140
 Ala Phe Lys Val Ala Ala Thr Ala Ala Ala Thr Ala Pro Ala Asp Asp
 145 150 155 160
 Lys Phe Thr Val Phe Glu Ala Ala Phe Asn Lys Ala Ile Lys Glu Ser
 165 170 175
 Thr Gly Gly Ala Tyr Asp Thr Tyr Lys Cys Ile Pro Ser Leu Glu Ala
 180 185 190
 Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Gln Val
 195 200 205
 Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met
 210 215 220
 Ser Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
 225 230 235 240
 Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala
 245 250 255
 Thr Val Ala Ala Gly Gly Tyr Lys Val
 260 265

<210> 89

<211> 265

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<223> Description of Artificial Sequence: Recombinant
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 Val Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Ser Val Pro Ala Ala
 35 40 45
 Leu Ala Phe Lys Thr Phe Glu Ala Ala Phe Thr Ser Ser Ser Lys Ala
 50 55 60
 Ala Ala Ala Lys Ala Pro Gly Leu Val Pro Lys Leu Asp Ala Ala Tyr
 65 70 75 80

Ser Val Ala Tyr Lys Ala Ala Val Gly Ala Thr Pro Glu Ala Lys Phe
 85 90 95
 Asp Ser Phe Val Ala Ser Leu Thr Glu Ala Leu Arg Val Ile Ala Gly
 100 105 110
 Ala Leu Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro Gly Met
 115 120 125
 Ala Lys Ile Pro Ala Gly Glu Leu Gln Ile Ile Asp Lys Ile Asp Ala
 130 135 140
 Ala Phe Lys Val Ala Ala Thr Ala Ala Ala Thr Ala Pro Ala Asp Asp
 145 150 155 160
 Lys Phe Thr Val Phe Glu Ala Ala Phe Asn Lys Ala Ile Lys Glu Ser
 165 170 175
 Thr Gly Gly Ala Tyr Asp Thr Tyr Lys Cys Ile Pro Ser Leu Glu Ala
 180 185 190
 Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Gln Val
 195 200 205
 Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met
 210 215 220
 Ser Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
 225 230 235 240
 Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala
 245 250 255
 Thr Val Ala Ala Gly Gly Tyr Lys Val
 260 265

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<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Recombinant
allergen

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 Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asn
 20 25 30
 Val Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Ser Val Pro Ala Ala
 35 40 45

Asp Lys Phe Lys Thr Phe Glu Ala Ala Phe Thr Ser Ser Ser Lys Ala
 50 55 60
 Ala Ala Ala Lys Ala Pro Gly Leu Val Pro Lys Leu Asp Ala Ala Tyr
 65 70 75 80
 Ser Val Ala Tyr Lys Ala Ala Val Gly Ala Thr Pro Glu Ala Lys Phe
 85 90 95
 Asp Ser Phe Val Ala Ser Leu Thr Glu Ala Leu Arg Val Ile Ala Gly
 100 105 110
 Ala Leu Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro Gly Met
 115 120 125
 Ala Lys Ile Pro Ala Gly Glu Leu Gln Ile Ile Asp Lys Ile Asp Ala
 130 135 140
 Ala Phe Lys Val Ala Ala Thr Ala Ala Ala Thr Ala Pro Ala Asp Asp
 145 150 155 160
 Lys Phe Thr Val Phe Glu Ala Ala Phe Asn Lys Ala Ile Lys Glu Ser
 165 170 175
 Thr Gly Gly Ala Tyr Asp Thr Tyr Lys Cys Ile Pro Ser Leu Glu Ala
 180 185 190
 Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Gln Val
 195 200 205
 Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met
 210 215 220
 Ser Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
 225 230 235 240
 Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala
 245 250 255
 Thr Val Ala Ala Gly Gly Tyr Lys Val
 260 265

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<211> 182

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Recombinant allergen

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 1 5 10 15
 Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asn
 20 25 30

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<400> 92

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| Ala | Asp | Ala | Gly | Tyr | Ala | Pro | Ala | Thr | Pro | Ala | Ala | Ala | Gly | Ala | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Ala | Gly | Lys | Ala | Thr | Thr | Glu | Glu | Gln | Lys | Leu | Ile | Glu | Asp | Ile | Asn |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Val | Gly | Phe | Lys | Ala | Ala | Val | Ala | Ala | Ala | Ala | Ser | Val | Pro | Ala | Ala |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Leu | Ala | Gly | Ala | Tyr | Asp | Thr | Tyr | Lys | Cys | Ile | Pro | Ser | Leu | Glu | Ala |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ala | Val | Lys | Gln | Ala | Tyr | Ala | Ala | Thr | Val | Ala | Ala | Ala | Pro | Gln | Val |
| 65 | | | | | 70 | | | | 75 | | | | | 80 | |

Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met
85 90 95

Ser Glu Val Gln Lys Val Ser Gln Pro Ala Thr Gly Ala Ala Thr Val
100 105 110

Ala Ala Gly Ala Ala Thr Thr Ala Ala Gly Ala Ala Ser Gly Ala Ala
115 120 125

Thr Val Ala Ala Gly Gly Tyr Lys Val
130 135

<210> 93

<211> 241

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<220>

<223> Description of Artificial Sequence: Recombinant
allergen

<400> 93

Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Ala Ala Gly Ala Ala
1 5 10 15

Ala Gly Lys Ala Thr Thr Glu Glu Gln Lys Leu Ile Glu Asp Ile Asn
20 25 30

Val Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Ser Val Pro Ala Ala
35 40 45

Asp Lys Phe Lys Thr Phe Glu Ala Ala Phe Thr Ser Ser Ser Lys Ala
50 55 60

Ala Ala Ala Lys Ala Pro Gly Leu Val Pro Lys Leu Asp Ala Ala Tyr
65 70 75 80

Ser Val Ala Tyr Lys Ala Ala Val Gly Ala Thr Pro Glu Ala Lys Phe
85 90 95

Asp Ser Phe Val Ala Ser Leu Thr Glu Ala Leu Arg Val Ile Ala Gly
100 105 110

Ala Leu Glu Val His Ala Val Lys Pro Val Thr Glu Glu Pro Gly Met
115 120 125

Ala Lys Ile Pro Ala Gly Glu Leu Gln Ile Ile Asp Lys Ile Asp Ala
130 135 140

Ala Phe Lys Val Ala Ala Thr Ala Ala Gly Gly Ala Tyr Asp Thr Tyr
145 150 155 160

Lys Cys Ile Pro Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala
165 170 175

Thr Val Ala Ala Ala Pro Gln Val Lys Tyr Ala Val Phe Glu Ala Ala
180 185 190

Leu Thr Lys Thr Ile Thr Ala Met Ser Glu Val Gln Lys Val Ser Gln
 195 200 205

Pro Ala Thr Gly Ala Ala Thr Val Ala Ala Gly Ala Ala Thr Thr Ala
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Ala Gly Ala Ala Ser Gly Ala Ala Thr Val Ala Ala Gly Gly Tyr Lys
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Val

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Remarks:

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